PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2002-165101

(43)Date of publication of application : 07.06.2002

(51)Int.Cl. H04N 1/46
G03G 15/01
G03G 21/00
G06T 1/00
H04N 1/60

(21)Application number : 2000-358364

(22)Date of filing : 24.11.2000

(71)Applicant : RICOH CO LTD

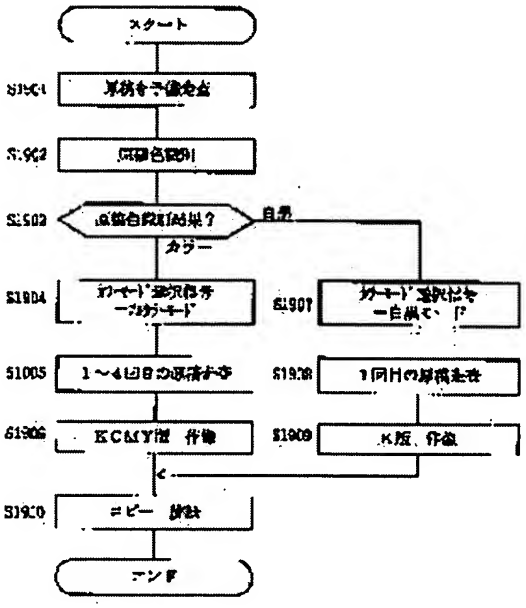
(72)Inventor : TSUJI KATSUHISA

(54) COLOR IMAGE FORMING DEVICE

(57)Abstract:

PROBLEM TO BE SOLVED: To provide a color image forming device, capable of copying and forming an image in an optimum color mode, at a low cost and in a short time.

SOLUTION: A manuscript is preliminarily scanned (S1901) to discriminate the colors of the manuscript (S1902). If the discriminated result of the color of the manuscript is that the manuscript is black and white (S1903: black and white), a K plate for a black and white mode is set (S1907). Based on read out data in the first manuscript scanning (S1908), image formation is performed for the K plate (S1909), and the copy is ejected (S1910). When the discrimination result of the color of the manuscript is that the manuscript is colored (S1903: color), the CPU 3 sets a KCMY plate for a full-color mode (S1904). Based on the data read out in the manuscript scanning from the first time to the fourth time (S1905), image formation is performed for the color plate with four colors of the KCMY (S1906), and the copy is ejected (S1910).



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

JAPANESE [JP,2002-165101,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS DESCRIPTION OF DRAWINGS DRAWINGS

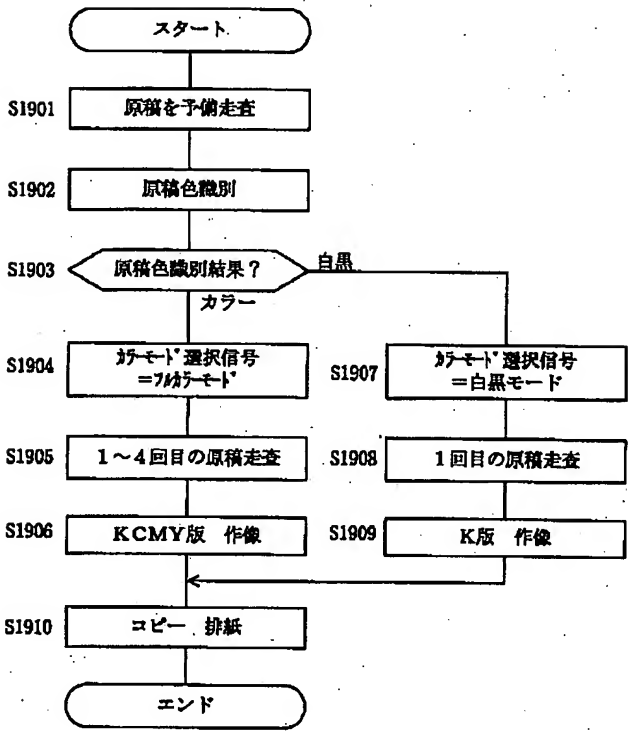
[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The image reading means read as image data of the digital signal which separated the color of a manuscript into R (red), G (Green), and B (blue), A color discernment means by which the manuscript read by said image reading means identifies monochrome manuscript or a color copy, An image formation means to perform image formation for the image data read by said image reading means using the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black), In which imaging mode of two or more kinds of color modes said whose image formation means are the combination of three colors among monochrome mode or said Y, M and C, all K4 colors or said Y, M and C, and K color image formation is performed, and a setting means to set up, A preparation and said image formation means perform image formation by the color mode determined by the setting means when a manuscript was discriminated from a color copy by said color discernment means. Color picture formation equipment characterized by performing image formation in monochrome mode when a manuscript is discriminated from monochrome manuscript by said color discernment means.
[Claim 2] Color picture formation equipment according to claim 1 characterized by containing 2 color mode which is the combination of two colors among said Y, M and C, and K color in the color mode which is the combination of three colors among said Y, M and C which are memorized by said color-material storage means, all K4 colors or said Y, M and C, and K color.
[Claim 3] At the same time said image formation means carries out image formation of the image data read by the 1st time with said image reading means in K color When a manuscript is discriminated from a color copy by said color discernment means Color picture formation equipment according to claim 1 or 2 characterized by performing image formation by the color material of said K color when image formation is performed using color material other than K color among said Y, M and C, and K color and a manuscript is discriminated from monochrome manuscript by said color discernment means.

[Translation done.]

Drawing selection Representative drawing



[Translation done.]

CLAIMS

[Claim(s)]
[Claim 1] The image reading means read as image data of the digital signal which separated the color of a manuscript into R (red), G (Green), and B (blue), A color discernment means by which the manuscript read by said image reading means identifies monochrome manuscript or a color copy, An image formation means to perform image formation for the image data read by said image reading means using the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black), In which imaging mode of two or more kinds of color modes said whose image formation means are the combination of three colors among monochrome mode or said Y, M and C, all K4 colors or said Y, M and C, and K color image formation is performed, and a setting means to set up, A preparation and said image formation means perform image formation by the color mode determined by the setting means when a manuscript was discriminated from a color copy by said color discernment means. Color picture formation equipment characterized by performing image formation in monochrome mode when a manuscript is discriminated from monochrome manuscript by said color discernment means.
[Claim 2] Color picture formation equipment according to claim 1 characterized by containing 2 color mode which is the combination of two colors among said Y, M and C, and K color in the color mode which is the combination of three colors among said Y, M and C which are memorized by said color-material storage means, all K4 colors or said Y, M and C, and K color.
[Claim 3] At the same time said image formation means carries out image formation of the image data read by the 1st time with said image reading means in K color When a manuscript is discriminated from a color copy by said color discernment means Color picture formation equipment according to claim 1 or 2 characterized by performing image formation by the color material of said K color when image formation is performed using color material other than K color among said Y, M and C, and K color and a manuscript is discriminated from monochrome manuscript by said color discernment means.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to color picture formation equipments, such as full color and a digital color copying machine which forms an image in monochrome mode, and color facsimile equipment.
[0002]
[Description of the Prior Art] Generally, a digital process copying machine reads a manuscript image for every pixel using CCD (charge KAPPURUDO device) image sensors etc., carries out A/D (analog/digital) conversion of the analog electrical signal acquired by the output of image sensors, after it performs various processings to the digital signal acquired, gives the signal to a recording device and acquires a copy image. Especially, in a digital color copying machine, the color is separated into R (red), G (Green), and B (blue), the manuscript which should be copied is read, the color material of Y (yellow), M (MAZENDA), C (cyanogen), and K (black) is used based on this image data, and a color picture is reproduced. By the way, the technique which repeats only the class of color material using the process which twists the recording paper around an imprint drum, forms in Junji Men the image corresponding to the color material of two or more colors used for record as this kind of color picture formation equipment at photo conductor drum lifting, and is imprinted on the recording paper is indicated by JP,63-107274,A. With the technique of this JP,63-107274,A, when reproducing a color picture by four colors of YMCK, 4 times of imaging processes will be repeated.
[0003] Although it can reappear only by K theoretically when the manuscript which should be copied consists of only black and white like the document manuscript seen in office, it becomes a troublesome thing to direct to equipment whether an operator copies only by K by distinguishing a manuscript color in detail or it copies by four colors of YMCK. [many] Moreover, when copying the manuscript with which black and white and a color were intermingled, it will be necessary to classify a manuscript into monochrome manuscript and a color copy beforehand, and to set a manuscript to ADF in 2 steps in a copying machine with an automatic manuscript feed gear (ADF:Auto Document Feeder). So, in JP,63-107274,A, in advance of imaging, the preliminary scan (press can) of the manuscript is carried out as a cure of this fault, and it identifies whether a manuscript is only monochrome image, and when it is monochrome manuscript, the sequence copied only by K is performed. Moreover, when it is a color copy, the sequence copied by four colors of YMCK is performed. However, by this approach, since it is necessary to scan a manuscript once too much [except / for original imaging], the time amount which a copy takes will become long.
[0004] moreover, as an approach of canceling the fault in the case of reading into a JP,3-54972,A official report the manuscript with which monochrome manuscript and the color copy are intermingled by ADF A manuscript color is identified at the same time it performs image formation in K color by the 1st manuscript scan, it is at the 1st scan termination time, and when it discriminates from monochrome manuscript, a copy sequence is closed only by K, and when it discriminates from a color copy, the technique of performing the sequence of the image formation of a color component succeedingly is

indicated. By this approach, in order that only the count of a record color may perform a manuscript scan, the time amount which a copy takes does not become long. Thus, by recent years, the ratio of a color copy is increasing rapidly in the manuscript used in office, and when copying the manuscript with which monochrome manuscript and the color copy are intermingled, the copy of a color and monochrome mixture manuscript can be performed by using an ASC (automatic color selection, auto color selection) function, without hanging a help.

[0005]

[Problem(s) to be Solved by the Invention] However, since the ratio of a color and monochrome mixture manuscript had increased, even if it is a color copy, it is full color and it is not necessary to copy, even when just two colors of red/black are enough, it will be full color and will be copied, and cost was high and might also cut copy time amount in many. In such a case, it is desirable to perform a copy in 2 color mode which reproduces the color part in a manuscript in the red who is for example, an assignment color, blue, green, etc., and reproduces the black (achromatic color) section black. However, since all color monochrome mixture manuscripts also including a monochrome manuscript will be copied in 2 color mode when 2 color mode is chosen, cost became high, and there was a case where it took copy time amount.

[0006] Then, the purpose of the 1st invention is offering the color picture formation equipment which can take a copy by the optimal color mode in low cost and a short time in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included. The 2nd purpose of this invention is that copy regeneration with the full color mode or 2 color (black and white) mode offers selectable color picture formation equipment in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included. The 3rd purpose of this invention aims at the color picture formation equipment which can shorten the time amount which a copy takes in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included.

[0007]

[Means for Solving the Problem] The image reading means read in invention according to claim 1 as image data of the digital signal which separated the color of a manuscript into R (red), G (Green), and B (blue), A color discernment means by which the manuscript read by said image reading means identifies monochrome manuscript or a color copy, An image formation means to perform image formation for the image data read by said image reading means using the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black), In which imaging mode of two or more kinds of color modes said whose image formation means are the combination of three colors among monochrome mode or said Y, M and C, all K4 colors or said Y, M and C, and K color image formation is performed, and a setting means to set up, A preparation and said image formation means perform image formation by the color mode determined by the setting means when a manuscript was discriminated from a color copy by said color discernment means. When a manuscript is discriminated from monochrome manuscript by said color discernment means, said 1st purpose is attained by performing image formation in monochrome mode.

[0008] In invention according to claim 2, said 2nd purpose is attained in invention according to claim 1 by containing 2 color mode which is the combination of two colors among said Y, M and C, and K color to the color mode which is the combination of three colors among said Y, M and C which are memorized by said color-material storage means, all K4 colors or said Y, M and C, and K color. In invention according to claim 3, it sets to invention according to claim 1 or 2. Said image formation means When a manuscript is discriminated from a color copy by said color discernment means at the same time it carries out image formation of the image data read by the 1st time with said image reading means in K color When image formation is performed using color material other than K color among said Y, M and C, and K color and a manuscript is discriminated from monochrome manuscript by said color discernment means, said 3rd purpose is attained by performing image formation by the color material of said K color.

[0009]

[0009]
[Embodiment of the Invention] Hereafter, the gestalt of suitable operation of this invention is explained to a detail with reference to drawing 1 thru/or drawing 22 . Drawing 1 is the block diagram having shown the configuration of the image-processing section of color picture formation equipment. Color picture formation equipment is equipped with a scanner 1, the delay memory 2, CPU (central processing unit)3, a control unit 5, the printer section 6, and the image-processing section. The image-processing section consists of the image area separation section 100, the manuscript color discrimination decision circuit 106, the spatial filter processing section 107, the color correction processing section 108, and the gradation processing section 109. The image area separation section 100 is equipped with the photograph field judging circuit 101, the alphabetic character field judging circuit 102, the halftone dot field judging circuit 103, the color judging circuit 104, and the comprehensive judgment circuit 105. The comprehensive judgment circuit 105 carries out a comprehensive judgment from the image area separation result of each circuits 101-104, determines an image area, and it transmits an image area separation signal to the spatial filter processing section 107, the color correction processing section 108, and the gradation processing section 109 so that a suitable image processing may be chosen. The manuscript color discrimination decision circuit 106 is a circuit which judges monochrome manuscript with which a manuscript consists of only monochrome images, and the color copy containing a color picture.
[0010] First, the color judging circuit 104 is explained with reference to drawing 2 . Drawing 2 is the block diagram having shown the configuration of the color judging circuit 104. This image area separation section 100 can reproduce a black alphabetic character in high quality in black monochrome by using, when the full color mode is set up. the color judging circuit 104 -- **RGB calculation circuit 121, the achromatic color pixel detector 122, and counting -- it has the section 123 and the achromatic-locus judging 124. In this color judging circuit 104, it distinguishes whether the pixel read with the scanner 1 is colorless, or it is a chromatic color. Since the level of R, G, and B data has gathered, an achromatic color pixel calculates difference deltaRGB between R, G, and B data the following formulas (1) by **RGB calculation circuit 121.
max(R, G, B)-min (R, G, B) ... (1)
The achromatic color pixel detector 122 is detected as an achromatic color pixel, when **RGB value calculated by the formula (1) is smaller than a predetermined value. the detected achromatic color pixel -- counting -- counting of whether it is in an about 3x3-pixel field more than the predetermined number in the section 123 is carried out. and counting -- in a certain case, according to the result in the section 123, it is judged with an achromatic locus by the achromatic-locus judging 124 more than the predetermined number to an about 3x3-pixel field.
[0011] Drawing 3 is drawing having shown the circuitry of the judgment section of the manuscript color discrimination decision circuit 106. A manuscript color is judged based on the output signal of the color judging section 104. A color judging signal is inputted synchronizing with the pixel synchronizing signal GCLK from initiation of the preliminary scan of a manuscript, or the 1st manuscript scan to termination. A flip-flop (FF) 31 detects whether a detecting signal is set to 1 (H condition) during a manuscript scan. It is in H condition during a shelf-life, and the signal FGATE which shows a frame shelf-life is in L condition during a non-shelf-life. Therefore, the detection result currently held at FF31 at the time of scan initiation is cleared, and it detects whether the detecting signal set to H during a scan is inputted again. The detecting signal which shows whether the flip-flop (FF) 32 had the detecting signal of H condition at the time of scan termination is held. Consequently, when a color pixel is detected in a manuscript, a judgment result is set to 1, and it is judged with the manuscript being a color copy. Conversely, when a color pixel is not detected, a judgment result is set to 0, and it is judged with the manuscript being monochrome manuscript. A judgment result is sent to CPU3 and controls consecutiveness of CPU3 based on this judgment result.
[0012] Next, the image-processing circuit which performs image reconstruction is explained. As shown in drawing 1 , image reconstruction is performed by the part which consists of the spatial filter processing sections 107 of the image-processing section, the color correction processing sections 108,

The spatial filter processing section 107 performs data smoothing in order to prevent generating of moire to a halftone dot image, and it performs edge enhancement processing to the image of which definition is required like an alphabetic character and a line drawing. Although strong smoothing is unnecessary like [in the case of the photograph which is a continuous tone image] a halftone dot image, even if it applies edge enhancement too much strongly so that it may be an alphabetic character image, it keeps becoming the rough image with which the image was influenced of the noise. For this reason, according to liking, through (filtering is not carried out) or processing predetermined [the inside of weak edge enhancement processing to] is chosen from weak smoothing. The color correction processing section 108 amended gap from the ideal of the spectral characteristic of the color material which is used by distortion and the printer of the color-separation property of a scanner in the case of the full color mode, and is equipped with the masking circuit 118 for securing proper color reproduction nature, and the UCR (undershirt color RIMUBARU, lower color removal) circuit 128 for transposing the equivalent parts of Y, M, and C to K.

[0013] Drawing 4 is drawing having shown the color correction of the color correction processing section 108, and the configuration of the UCR circuit 128. Here, data are computed by Junji Men about KCMY each color. The UCR processing circuit 143 subtracts the amount of K computed in the amount calculation circuit 142 of UCR(s) from C and M which are computed from the color correction circuit 141, or Y data. R, G, B data and C and M, and Y data are called for by the following formulas. Here, C, M, and the amount of Y are calculated by primary association (linearity amendment) of R, G, and B data. In addition, a formula (2) is the operation expression of color correction.

| C|=|a11 a12 a13||R|=|d1||M|=|a21 a22 a23||G|+|d2| ... (2)

| Y|=|a31 a32 a33||B|=|d3| [0014] Drawing 5 is drawing having shown the circuit of the color correction processing section 108 which performs a color correction operation. Moreover, drawing 6 is drawing having shown the conversion table of a hue judging. Here, as shown in drawing 6 , it divided into seven hue fields (gray, R-Y, Y-G, G-C, C-B, B-M, M-R) from the size relation of RGB, and highly precise-ization of amendment is measured using the color correction factor (multiplier of primary association) optimized for every hue field. The circuit which performs the color correction operation shown in this drawing 5 is equipped with the multipliers 155-MUL 157 for carrying out a sum-of-products operation with the registers 151-REG 154 holding a color correction factor (a1, a2, a3, d), and a RGB picture signal, adders 158-ADD 160, and the hue discrimination circuit 150. With the hue discrimination signal outputted from the hue discrimination circuit 150, each registers 151-154 carry out the selection output of the corresponding multiplier. These multiplier data are rewritten by CPU3 according to the color version which should be processed, and control is performed.

[0015] Drawing 7 -11 are drawing having shown the example with various color correction factors. Drawing 7 is drawing having shown the color correction factor for C at the time of the full color mode, M, and the Y-th edition. It has a multiplier optimized for every hue. Although it changes with UCR processings mentioned later the K-th edition o'clock, the value acquired by the following formulas (3) is used as an amount of K. In addition, it is a predetermined multiplier corresponding to the rate of ** UCR.

min(R, G, B) xalpha ... (3)

[0016] Drawing 8 is drawing having shown the color correction factor at the time of 2 color mode. In addition, the case of two colors of black and cyanogen (C) is shown as 2 color mode here. In this mode, a chromatic color field is reproduced with cyanogen and an achromatic locus is reproduced by K. When reproducing a chromatic color field, it has a multiplier which carries out a weighting average at a rate of 3:6:1 to RGB data so that the brightness information of a manuscript can be reproduced in a cyanogen color. Here, since M and the Y-th edition are not formed, all of M and the multiplier to the Y-th edition are 0. Drawing 9 is drawing having shown the color correction factor of the K-th edition at the time of 2 color mode. Only the gray hue section is reproduced in K color. Although drawing 8 is also a color correction factor at the time of 2 color mode, at drawing 9 , it has composition which reproduces only a specific hue field in a cyanogen color, and only the hue over a cyanogen - blue field is reproduced in a cyanogen color.

[0017] Drawing 10 is drawing having shown the color correction factor of the K-th edition at the time of reproducing the gray hue section at the time of 2 color mode in K color, and reproduces chromatic color fields other than a gray field and C-area B in K color. Drawing 11 is drawing having shown color correction factors of the K-th edition other than C-area B at the time of 2 color mode. A reappearance color may not be limited to the combination of black/cyanogen, and combination with other M, Y, R, G, B colors, or these neutral colors is sufficient as 2 color mode. Moreover, it is not necessary to also make in agreement with an imaging color the hue field reproduced with a chromatic color for example, and it is green and you may make it reproduce a red - yellow field. In addition, when reproducing a reappearance color in a secondary color or neutral colors, such as RGB, imaging by K and 3 in all colors is needed. As mentioned above, although explained to the color correction processing section 108 which computes the amount of UCR(s), i.e., a color correction factor, the same thing as the color correction circuit shown in drawing 5 may be used for the amount calculation circuit 142 of UCR(s) of drawing 4 . Although the amount of UCR(s) at the time of 100% of rates of UCR is the minimum value of CMY, this is an equal in [the minimum value of RGB] approximation. In the color correction circuit of drawing 5 , the amount of UCR(s) can be calculated by setting the multiplier to the data used as the inner min of RGB to 1 in each hue, since it has the function which distinguishes the size relation of RGB, and setting other multipliers to 0. The rate of UCR of arbitration can be set up by setting the multiplier to the minimum data to not 1 but 0.8, 0.5, etc. at this time.

[0018] Next, UCR processing is explained. Drawing 12 is drawing explaining the concept of UCR processing. All colors can be expressed if the color material of three colors of C, M, and Y which are subtractive primaries theoretically is used. Here, the case where a certain color is expressed in the combination of the amount of CMY(s) of drawing 12 (a) is explained. First, since it will become black (achromatic color) if C, M, and Y are used equivalent [every], a part for equivalence can be transposed to the color material of K. the same [the whole quantity of Y, and among C and M] as Y in this combination of C, M, and Y, since there is least Y -- a part -- it can transpose to K by reducing. Consequently, as shown in drawing 12 (c), the same color can be expressed by the color material of three colors of C, M, and K. Thus, the case where all the amounts (amount of a black component) that can be transposed to K among the original combination of C, M, and Y are transposed to K is said that the rate of UCR is 100%.

[0019] When transposing one half to K among black components like drawing 12 (b), the rate of UCR becomes 50%. If the rate of UCR is made high, the total amount of color material can be reduced, and high-concentration black is reproducible good, and while there is an advantage that management of gray balance becomes easy, since it almost reappears in K Isshiki, it is especially easy to become the rough sensibility in the highlights section of a color near gray. Moreover, since whenever [coloring] is generally high, K tends to become the impression of black Isshiki like Japanese ink, when K enters. Therefore, by the photograph and pattern image than to which greater importance is attached to gradation nature or color reproduction nature, if it hangs on middle from highlights, the rate of UCR is set as a low eye, and in the high concentration section, it sets up so that the rate of UCR may become high. Moreover, even if it is a photograph, the dynamic range of a concentration expression is large like a film photo, to the manuscript to which the shadow section is also made as for the expression of gradation change, the shadow section does not make [many / not much] the amount of UCR(s), either, but a tone reproduction with better combining CMY and K is acquired. On the other hand, with a printing photograph manuscript, since there is not not much much gradation of the high concentration section, it can reproduce a condition with black Isshiki where it is more sufficient to set up the rate of UCR highly in the shadow section. On the other hand, with an alphabetic character manuscript, greater importance is attached than to color reproduction nature to definition, and with a black alphabetic character manuscript, when reappearing by three colors of CMY, image quality tends [especially] to deteriorate by gap fellow blurring between the color versions. Therefore, in order to reduce the total amount of color material as much as possible to an alphabetic character manuscript, it is desirable to set up the rate of UCR highly.

[0020] Drawing 13 is drawing having shown the example of a setting of the rate of UCR. The rate of

UCR is 100% (full black) in all the concentration fields in the case of transposing all black components to K, and (a) is a setup of the alphabetic character manuscript sense containing a black alphabetic character. (b) And (c) is the case where the rates of UCR are D3/Dmax, and D2/Dmax in all concentration fields, respectively. Although the rates of UCR in the maximum-density section are D3/Dmax and D2/Dmax 100% in (d), (e), and (f), respectively, in both the highlights sections to concentration D1, the rate of UCR is 0% and K is a setup which it is not used but the rate of UCR increases gradually from a middle field or subsequent ones (such a UCR setup is called skeleton black).
[0021] In the rate of UCR of the shadow section, (d) and (e) are printing photograph manuscript sense, and (f) is the film photo manuscript sense. At the time of mounting, not only these UCR properties but the start point of UCR may be shifted from D1, and it can also constitute so that the rate of UCR at the time of maximum density can also choose these middle things. A user comes to be able to do the optimal setup of UCR thereby according to liking. Like (d) of drawing 13 , (e), and (f), in order to set the rate of UCR to 0 by concentration lower than a certain concentration, a negative value is set as the constant term d of the color correction factor of drawing 3 . As shown in (d), when making the rate of UCR into 100% in the maximum-density section, the multiplier to the minimum data can be realized by making it larger than 1 to coincidence. In addition, in the color correction circuit of this drawing 3 , when the result of a sum-of-products operation is negative, an output value is set to 0.
[0022] The gradation processing section 109 performs halftone processing by the dither pattern of a dot concentration mold to a photograph and a halftone dot image for reservation of the number of gradation, or stabilization of gradation nature. Moreover, to the image which thinks definition as important like an alphabetic character and a line drawing image, dithering is not carried out but simple binary-ized processing is performed. With the gestalt of this operation, although the printer 6 has explained the case where only white or black binary level is reproducible per dot, when a multiple-value output is possible, it may be made to carry out not the formation of simple binary but simple multiple-value-ized processing and processing which also leaves gradation nature to some extent using the dither pattern of dot distributed process input output equipment like three values - 256 value. Moreover, if processing by the error diffusion method is used as gradation processing of gradation nature serious consideration, since the moire to a halftone dot image will be reduced, it is not necessary to perform strong data smoothing in spatial filter processing, and can also communalize with filtering for photographs.
[0023] Next, the procedure at the time of the image formation of color picture formation equipment is explained. Drawing 14 is the flow chart which showed the procedure at the time of the conventional image formation. If color mode is chosen from (step 1401; Y) and the control unit 5 which a user shows to drawing 1 at the time of a copy start, copy actuation will start (step 1402). as color mode selection (step 1402) -- or [monochrome mode, 2 color mode, the full color mode, and / being full color] -- there is ACS mode which makes automatic selection of whether it is black and white, and image formation in each mode is performed by the own alternative in a control unit 5 (steps 1403-1406).
[0024] Drawing 15 is the flow chart which showed the procedure at the time of the image formation of the color picture formation equipment concerning the gestalt of this operation. If color mode is chosen from (step 1501; Y) and the control unit 5 which a user shows to drawing 1 at the time of a copy start, copy actuation will start (step 1502). as color mode selection (step 1502) -- or [monochrome mode, 2 color mode, the full color mode, and / being full color] -- there is ACS mode which makes automatic selection of whether it is black and white (steps 1503-1506). By the own alternative in a control unit 5, image formation in each of these modes is performed.
[0025] In ACS mode, beforehand, (step 1506) and the imaging mode at the time of the color judging chosen from the control unit 5 by the user or the manager of a machine are memorized, and an imaging sequence is performed according to this set point. When 2 color mode is set as ASC mode (step 1506;2 color mode), image formation in 2 color mode is performed (step 1508). In addition, you may enable it to also set up addition conditions, such as combination of two colors which form an image, and an object color which should be reproduced, in a control unit 5. Moreover, when the full color mode is set as ASC mode (step 1506; full color mode), image formation in the full color mode is performed (step 1507).

[0026] Drawing 16 is the flow chart which showed the procedure at the time of choosing monochrome mode. If a print start button is pushed in a control unit 5, CPU3 will set up image-processing conditions so that the K-th edition for monochrome modes can be formed (step 1601). Imaging of the K-th edition is performed based on the reading data of the manuscript in one manuscript scan (step 1602) (step 1603), and paper is delivered to a copy (step 1604).
[0027] Drawing 17 is the flow chart which showed the procedure at the time of choosing 2 color mode. If a print start button is pushed in a control unit 5, CPU3 will set up image-processing conditions so that the KC version for 2 color modes of color mode can form an image (step 1701). Based on the reading data of the manuscript in the 1-2nd manuscript scans (step 1702), one by one, imaging of the color version of KC2 color is performed (step 1703), and paper is delivered to a copy (step 1704). In addition, when an imaging color changes to C from K, CPU3 resets image-processing conditions.
[0028] Drawing 18 is the flow chart which showed the procedure at the time of choosing the full color mode. If it is in a control unit 5 and a print start button is pushed, CPU3 will set up image-processing conditions so that the KCMY version for the full color modes of color mode can form an image (step 1801). Based on the reading data of the manuscript in the 1-4th manuscript scans (step 1803), one by one, imaging of the color version of KCMY4 color is performed (step 1803), and paper is delivered to a copy (step 1804).
[0029] Drawing 19 is the flow chart which showed procedure (1) when a user chooses ACS mode as color mode. It is procedure in case the selection at the time of the color judging by ASC is in full color mode. First, the preliminary scan of the manuscript is carried out (step 1901), and a manuscript color is identified (step 1902). CPU3 will perform image formation according to the control sequence in monochrome mode, if the discernment result of a manuscript color is monochrome manuscript (step 1903; black and white) (steps 1907-1909). CPU3 sets up image-processing conditions so that the K-th edition for monochrome modes can be formed (step 1907). Imaging of the K-th edition is performed based on the reading data of the manuscript in the 1st manuscript scan (step 1908) (step 1909), and paper is delivered to a copy (step 1910).
[0030] On the other hand, the discernment result of a manuscript color performs image formation according to the control sequence for the full color modes, when the judgment of CPU3 is a color copy (step 1903; color) (steps 1904-1906). CPU3 sets up image-processing conditions so that the KCMY version for the full color modes of color mode can form an image (step 1904). Based on the reading data of the manuscript in the 1-4th manuscript scans (step 1905), one by one, imaging of the color version of KCMY4 color is performed (step 1906), and paper is delivered to a copy (step 1910).
[0031] Drawing 20 is the flow chart which showed procedure (2) when a user chooses ACS mode as color mode. It is procedure in case the selection at the time of the color judging by ACS is in 2 color mode. First, the preliminary scan of the manuscript is carried out (step 2001), and a manuscript color is identified (step 2002). CPU3 will perform image formation according to the control sequence in monochrome mode, if a manuscript color discernment result is monochrome manuscript (step 2003; black and white) (steps 2007-2009). CPU3 sets up image-processing conditions so that the K-th edition for monochrome modes can be formed (step 2007). Imaging of the K-th edition is performed based on the reading data of the manuscript in the 1st manuscript scan (step 2008) (step 2009), and paper is delivered to a copy (step 2010).
[0032] On the other hand, CPU3 performs image formation according to the control sequence for 2 color modes, when the judgment of the discernment result of a manuscript color is a color copy (step 2003; color) (steps 2004-2006). CPU3 sets up image-processing conditions so that the KC version for 2 color modes of color mode can form an image (step 2004). Based on the reading data of the manuscript in the 1-2nd manuscript scans (step 2005), one by one, imaging of the color version of KC2 color is performed (step 2006), and paper is delivered to a copy (step 2010).
[0033] Drawing 21 is the flow chart which showed procedure (3) when a user chooses ACS mode as color mode. It is procedure when the selection at the time of the color judging by ASC is full color. First, discernment of (step 2101) and a manuscript color is performed at the time of the 1st manuscript scan, without carrying out the preliminary scan of the manuscript (step 2102). Thereby, since the

manuscript color is unknown at the time of the K-th edition imaging of one amorous glance, the UCR conditions of the K-th edition which can compute the black version data which are compatible in both [of a color / monochrome manuscript] case are set up (step 2103). When thinking a color picture as important when thinking monochrome image as important so that the K-th edition data of full black may be used and, the amount of UCR(s) can be chosen like a lower setup.
[0034] After the 1st manuscript scan is completed, CPU3 performs image formation according to the control sequence in the full color mode or monochrome mode according to the discernment result of a manuscript color. When the judgment of the discernment result of a manuscript color is monochrome manuscript (step 2104; black and white), CPU3 stops imaging only by the K-th edition, delivers paper to copy paper, and ends copy actuation (step 2108). When the judgment of the discernment result of a manuscript color is a color copy (step 2104; color), CPU3 sets up image-processing conditions so that the CMY version for the full color modes of color mode can form an image (step 2105). And the 2-4th manuscript scans are performed succeedingly (step 2106), and based on the reading data of the manuscript in the 2-4th manuscript scans, imaging of the color version of CMY3 color is performed (step 2107), and paper is delivered to a copy one by one (step 2108).
[0035] Drawing 22 is the flow chart which showed procedure (4) when a user chooses ACS mode as color mode. It is procedure in case the selection at the time of a color judging is in 2 color mode in ACS mode without a preliminary scan. Discernment of (step 2201) and a manuscript color is performed like the case of being full color, at the time of the 1st manuscript scan, without carrying out the preliminary scan of the manuscript (step 2202). And imaging of the K-th edition, i.e., UCR conditions, is set up as one amorous glance (step 2203). After the 1st manuscript scan is completed, CPU3 performs image formation according to the control sequence in 2 color mode or monochrome mode according to the discernment result of a manuscript color. When the judgment of the distinction result of a manuscript color is monochrome manuscript (step 2204; black and white), CPU3 stops imaging only by the K-th edition, delivers paper to copy paper, and ends copy actuation (step 2208).
[0036] When the judgment of the discernment result of a manuscript color is a color copy (step 2204), CPU3 sets up image-processing conditions so that the C version for 2 color modes of color mode can form an image (step 2205). And the 2nd manuscript scan is performed succeedingly (step 2206), imaging of the color version of C color is performed based on the reading data of the manuscript in the 2nd manuscript scan (step 2207), and paper is delivered to a copy (step 2208).
[0037] Although one amorous glance performs the K-th edition imaging like the case of being full color, in ACS mode without a preliminary scan with the gestalt of this operation when the selection at the time of a color judging is in 2 color mode, it is not influenced by the quality of a color picture like [at the time of full color selection] at the time of 2 color mode selection. In the case of 2 color mode, even when a manuscript is full color, copy images are two colors, and even if they carry out image formation of the K-th edition to the color difference with a manuscript on condition that monochrome serious consideration fundamentally not related, they can maintain quality. Although the K-th edition can use only the K-th edition data of black Isshiki at the maximum in consideration of the quality at the time of a full color manuscript when full color, at the time of 2 color mode, the K-th edition can use the same amount of K as monochrome mode, and the color picture to which color information was added can be obtained. Especially, the user with many low manuscripts of whenever [color / which added the color a little] instead of a full color pictorial image can be provided with color mode more useful than ACS of black and white / full color selection as a color copy.
[0038]
[Effect of the Invention] By invention according to claim 1, since an image formation means performs image formation by the color mode determined by the setting means when a manuscript is discriminated from a color copy by the color discernment means, and it performs image formation in monochrome mode when a manuscript is discriminated from monochrome manuscript by the color discernment means, it can perform image formation by the color mode which suited a user's demand quality in low cost and a short time. In invention according to claim 2, since 2 color mode which is the combination of two colors among Y, M, C, and K color is also contained, the image formation in a monochrome in-

between color can also be chosen as the color mode which is combination with various Y, M, C, and K colors as it is full color. In invention according to claim 3, at the same time an image formation means carries out image formation of the image data read by the 1st time with the image reading means in K color When a manuscript is discriminated from a color copy by the color discernment means Since image formation is performed by the color material of K color when image formation is performed using color material other than K color among Y, M, C, and K color and a manuscript is discriminated from monochrome manuscript by the color discernment means, the time amount which image formation takes can be shortened.

[Translation done.]

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] By invention according to claim 1, since an image formation means performs image formation by the color mode determined by the setting means when a manuscript is discriminated from a color copy by the color discernment means, and it performs image formation in monochrome mode when a manuscript is discriminated from monochrome manuscript by the color discernment means, it can perform image formation by the color mode which suited a user's demand quality in low cost and a short time. In invention according to claim 2, since 2 color mode which is the combination of two colors among Y, M, C, and K color is also contained, the image formation in a monochrome in-between color can also be chosen as the color mode which is combination with various Y, M, C, and K colors as it is full color. In invention according to claim 3, at the same time an image formation means carries out image formation of the image data read by the 1st time with the image reading means in K color When a manuscript is discriminated from a color copy by the color discernment means Since image formation is performed by the color material of K color when image formation is performed using color material other than K color among Y, M, C, and K color and a manuscript is discriminated from monochrome manuscript by the color discernment means, the time amount which image formation takes can be shortened.

[Translation done.]

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] However, since the ratio of a color and monochrome mixture manuscript had increased, even if it is a color copy, it is full color and it is not necessary to copy, even when just two colors of red/black are enough, it will be full color and will be copied, and cost was high and might also cut copy time amount in many. In such a case, it is desirable to perform a copy in 2 color mode which reproduces the color part in a manuscript in the red who is for example, an assignment color, blue, green, etc., and reproduces the black (achromatic color) section black. However, since all color monochrome mixture manuscripts also including a monochrome manuscript will be copied in 2 color mode when 2 color mode is chosen, cost became high, and there was a case where it took copy time amount.
[0006] Then, the purpose of the 1st invention is offering the color picture formation equipment which can take a copy by the optimal color mode in low cost and a short time in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included. The 2nd purpose of this invention is that copy regeneration with the full color mode or 2 color (black and white) mode offers selectable color picture formation equipment in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included. The 3rd purpose of this invention aims at the color picture formation equipment which can shorten the time amount which a copy takes in the color picture formation equipment which has the ACS function to identify whether a manuscript is only monochrome image or a color picture is included.

[Translation done.]

* NOTICES *

1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

CLAIMS

[Claim(s)]
[Claim 1] The image reading means read as image data of the digital signal which separated the color of a manuscript into R (red), G (Green), and B (blue), A color discernment means by which the manuscript read by said image reading means identifies monochrome manuscript or a color copy, An image formation means to perform image formation for the image data read by said image reading means using the color material of Y (yellow), M (Magenta), C (cyanogen), and K (black), In which imaging mode of two or more kinds of color modes said whose image formation means are the combination of three colors among monochrome mode or said Y, M and C, all K4 colors or said Y, M and C, and K color image formation is performed, and a setting-out means to set up, A preparation and said image formation means perform image formation by the color mode determined by the setting-out means when a manuscript was discriminated from a color copy by said color discernment means. Color picture formation equipment characterized by performing image formation in monochrome mode when a manuscript is discriminated from monochrome manuscript by said color discernment means.
[Claim 2] Color picture formation equipment according to claim 1 characterized by containing 2 color mode which is the combination of two colors among said Y, M and C, and K color in the color mode which is the combination of three colors among said Y, M and C which are memorized by said color-material storage means, all K4 colors or said Y, M and C, and K color.
[Claim 3] At the same time said image formation means carries out image formation of the image data read by the 1st time with said image reading means in K color When a manuscript is discriminated from a color copy by said color discernment means Color picture formation equipment according to claim 1 or 2 characterized by performing image formation with the color material of said K color when image formation is performed using color material other than K color among said Y, M and C, and K color and a manuscript is discriminated from monochrome manuscript by said color discernment means.

[Translation done.]

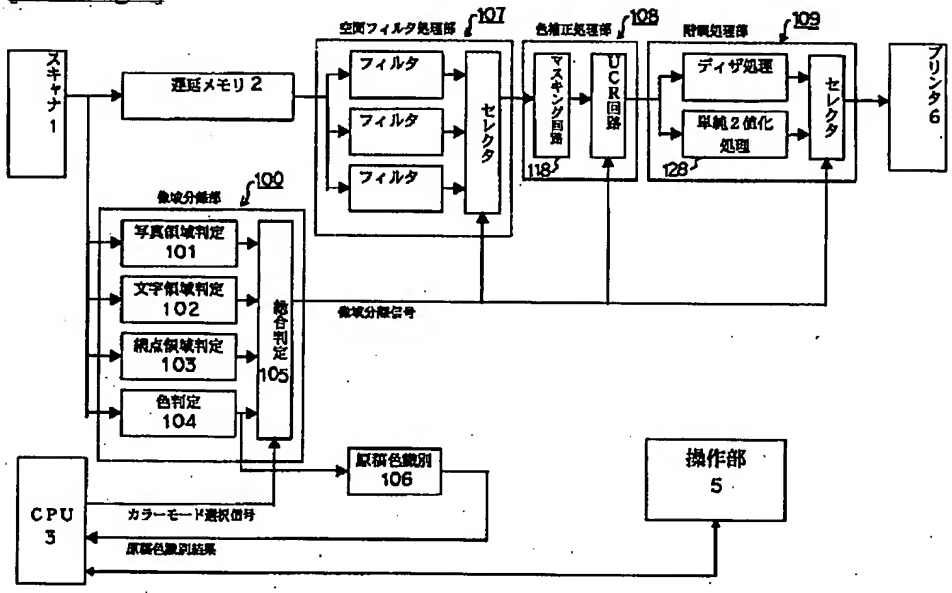
* NOTICES *

JPO and INPIT are not responsible for any damages caused by the use of this translation.

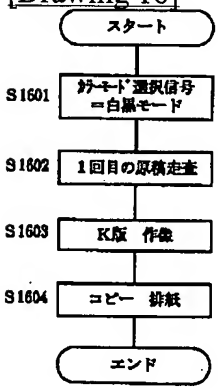
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

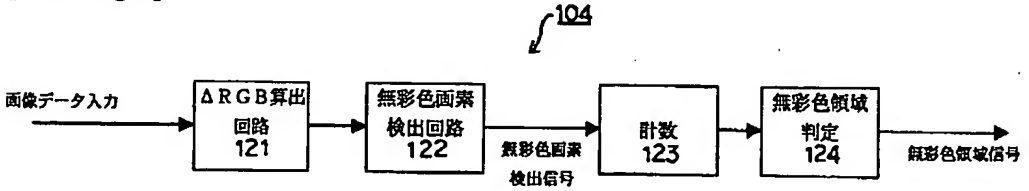
[Drawing 1]



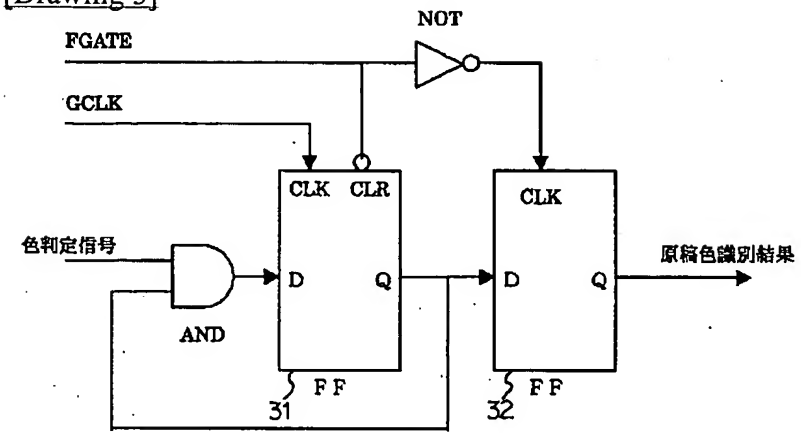
[Drawing 16]



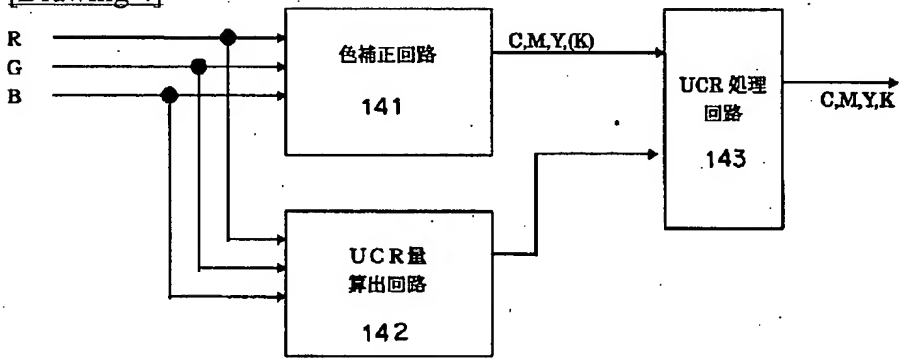
[Drawing 2]



[Drawing 3]



[Drawing 4]



[Drawing 6]

色相番号	色相領域名	判定条件
0	グレー	thr > (max(R,G,B) - min(R,G,B))
1	R-Y	B>G>R かつ グレーでない
2	Y-G	B>R>G かつ グレーでない
3	G-C	R>B>G かつ グレーでない
4	C-B	R>G>B かつ グレーでない
5	B-M	G>R>B かつ グレーでない
6	M-R	G>B>R かつ グレーでない

[Drawing 7]

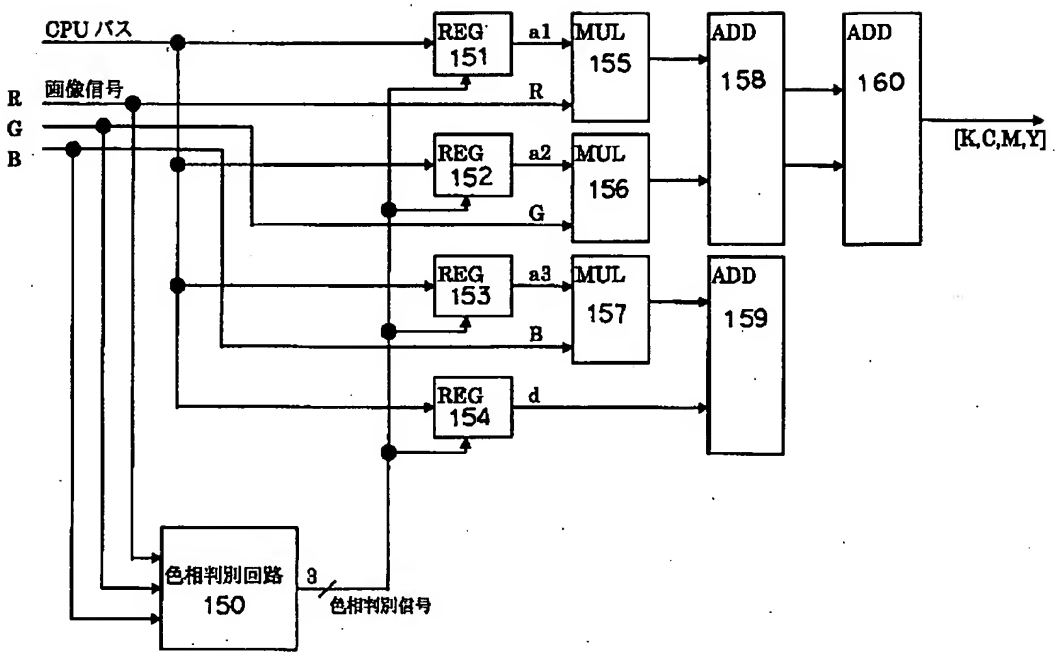
色相番号	色補正係数		
0 (グレー)	1 0 0	0 1 0	0 0 1
1 (R−Y)	1.51 -0.56 -0.07	-0.46 1.71 -0.56	-0.05 -0.17 1.62
2 (Y−G)	1.27 -1.09 -0.03	-0.23 2.24 -0.60	-0.05 -0.17 1.62
3 (G−C)	1.36 -1.18 -0.04	-0.26 2.44 -0.60	-0.12 -0.07 1.63
4 (C−B)	1.36 -1.18 -0.04	-0.26 2.44 -0.67	-0.12 -0.27 1.90
5 (B−M)	1.45 -0.62 -0.04	-0.34 1.88 -0.88	-0.12 -0.27 1.90
6 (M−R)	1.51 -0.56 -0.07	-0.34 1.88 -0.88	-0.17 -0.33 1.94

※各欄で、上の行から順番にC，M，Y版用の係数である。

[Drawing 10]

色相番号	色補正係数		
0 (グレー)	0．3	0．6	0．1
1 (R−Y)	0	0	0
2 (Y−G)	0	0	0
3 (G−C)	0	0	0
4 (C−B)	0	0	0
5 (B−M)	0	0	0
6 (M−R)	0	0	0

[Drawing 5]



[Drawing 8]

色相番号	色補正係数		
0 (グレー)	0	0	0
	0	0	0
	0	0	0
1 (R−Y)	0.3	0.6	0.1
	0	0	0
	0	0	0
2 (Y−G)	0.3	0.6	0.1
	0	0	0
	0	0	0
3 (G−C)	0.3	0.6	0.1
	0	0	0
	0	0	0
4 (C−B)	0.3	0.6	0.1
	0	0	0
	0	0	0
5 (B−M)	0.3	0.6	0.1
	0	0	0
	0	0	0
6 (M−R)	0.3	0.6	0.1
	0	0	0
	0	0	0

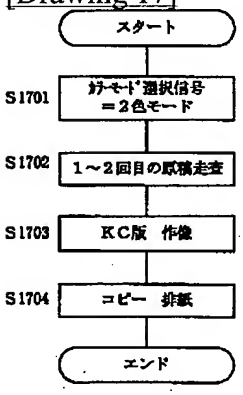
※各欄で、上の行から順番にC，M，Y版用の係数である。

[Drawing 9]

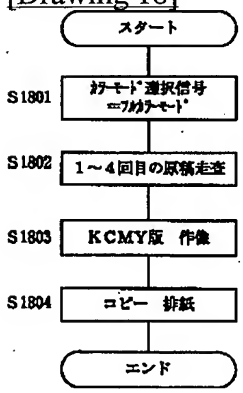
色相番号	色補正係数		
0 (グレー)	0 0 0	0 0 0	0 0 0
1 (R−Y)	0 0 0	0 0 0	0 0 0
2 (Y−G)	0 0 0	0 0 0	0 0 0
3 (G−C)	0 0 0	0 0 0	0 0 0
4 (C−B)	0．3 0 0	0．6 0 0	0．1 0 0
5 (B−M)	0 0 0	0 0 0	0 0 0
6 (M−R)	0 0 0	0 0 0	0 0 0

※各欄で、上の行から順番にC，M，Y版用の係数である。

[Drawing 17]



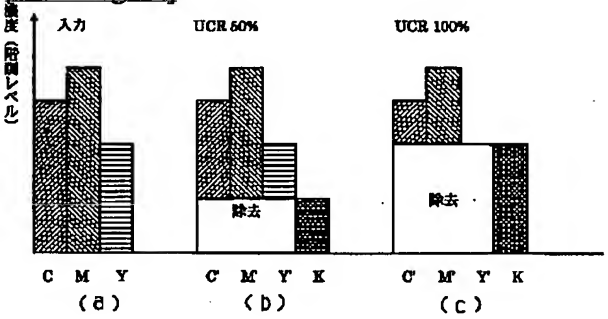
[Drawing 18]



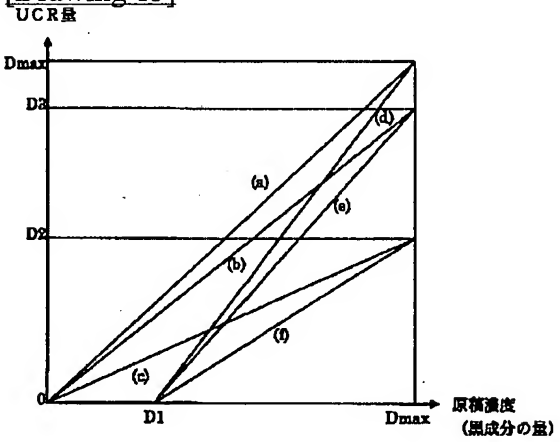
[Drawing 11]

色相番号	色補正係数
0 (グレー)	0.3 0.6 0.1
1 (R−Y)	0.3 0.6 0.1
2 (Y−G)	0.3 0.6 0.1
3 (G−C)	0.3 0.6 0.1
4 (C−B)	0 0 0
5 (B−M)	0.3 0.6 0.1
6 (M−R)	0.3 0.6 0.1

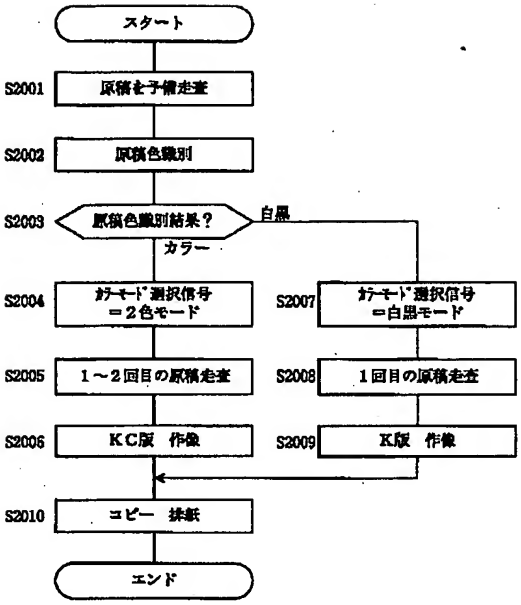
[Drawing 12]



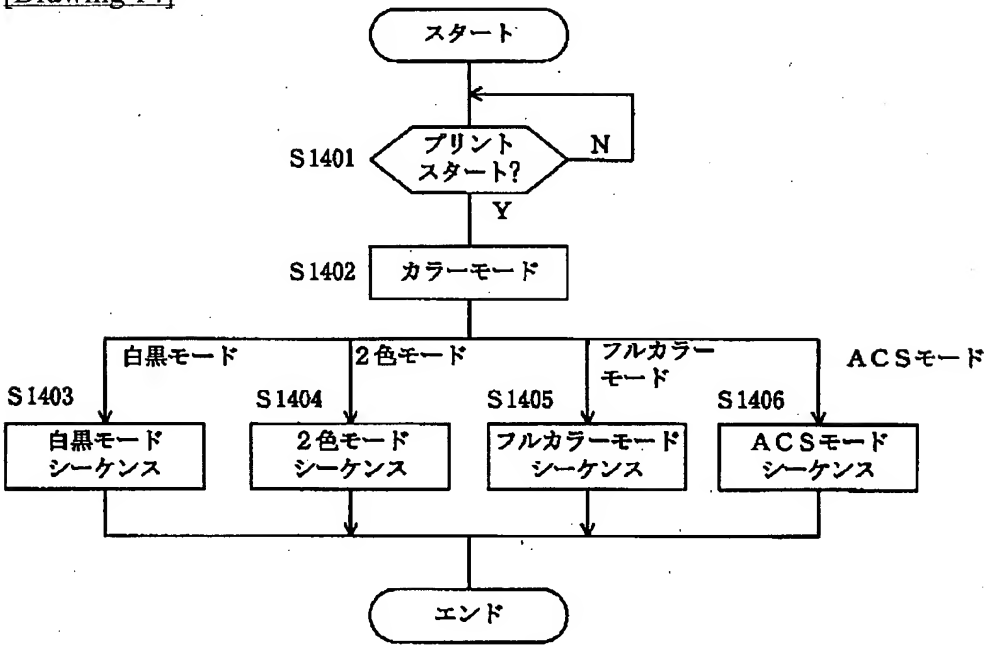
[Drawing 13]



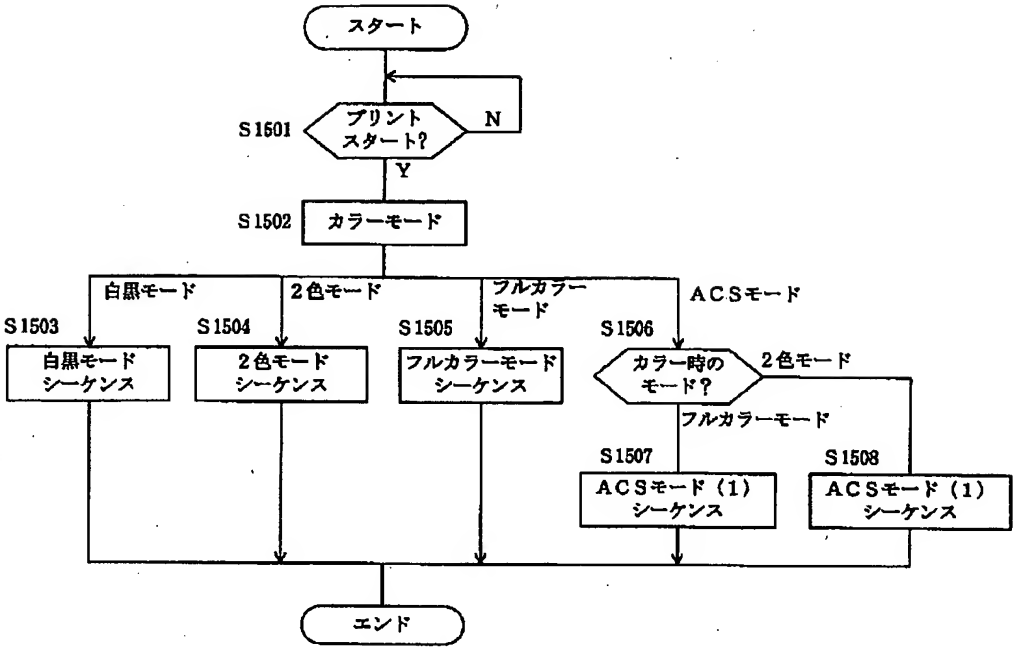
[Drawing 20]



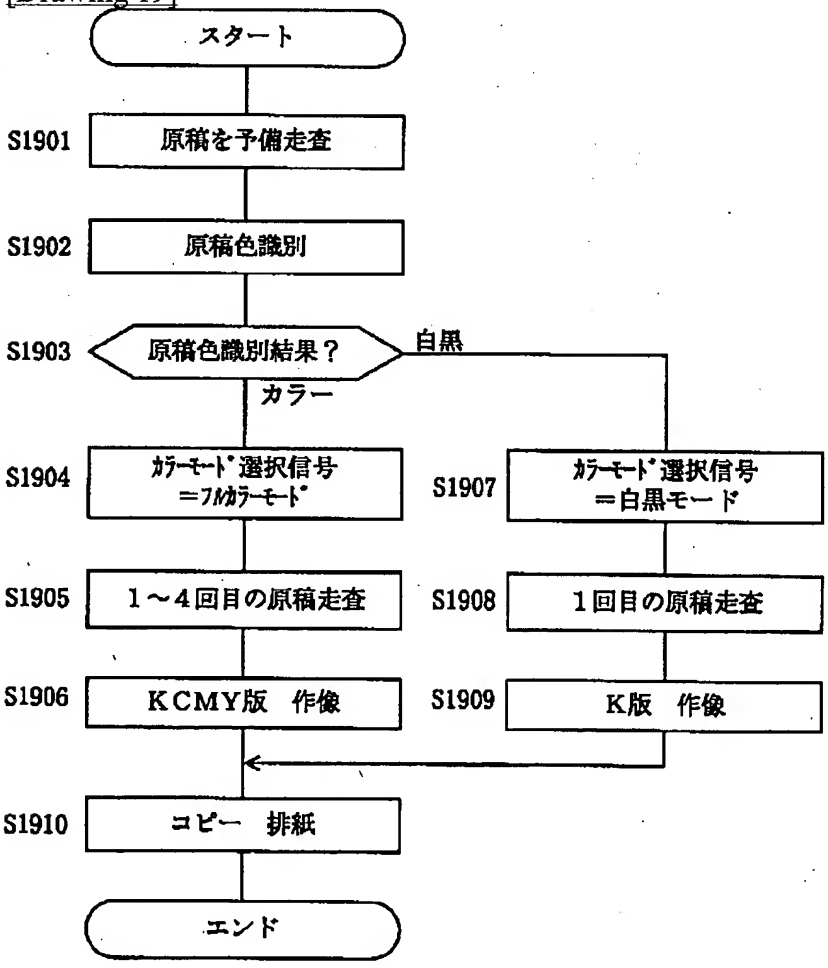
[Drawing 14]



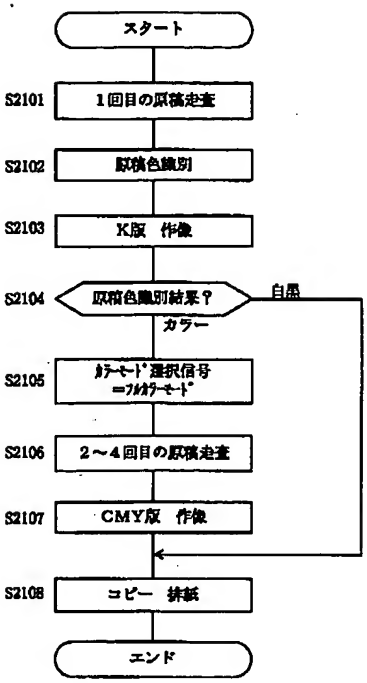
[Drawing 15]



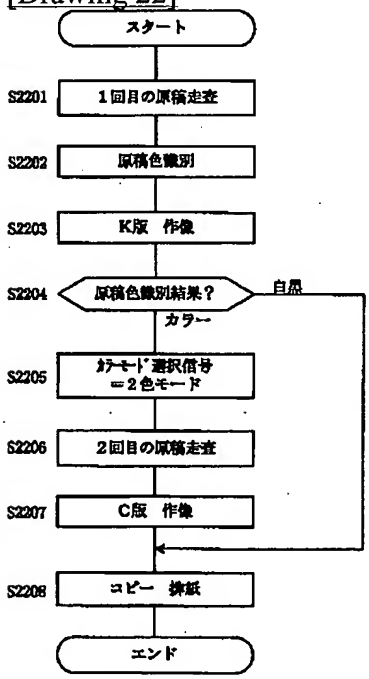
[Drawing 19]



[Drawing 21]



[Drawing 22]



[Translation done.]

PRIOR ART

[Description of the Prior Art] Generally, a digital process copying machine reads a manuscript image for every pixel using CCD (charge KAPPURUDO device) image sensors etc., carries out A/D (analog/digital) conversion of the analog electrical signal acquired by the output of image sensors, after it performs various processings to the digital signal acquired, gives the signal to a recording device and acquires a copy image. Especially, in a digital color copying machine, the color is separated into R (red), G (Green), and B (blue), the manuscript which should be copied is read, the color material of Y (yellow), M (MAZENDA), C (cyanogen), and K (black) is used based on this image data, and a color picture is reproduced. By the way, the technique which repeats only the class of color material using the process which twists the recording paper around an imprint drum, forms in Junji Men the image corresponding to the color material of two or more colors used for record as this kind of color picture formation equipment at photo conductor drum lifting, and is imprinted on the recording paper is indicated by JP,63-107274,A. With the technique of this JP,63-107274,A, when reproducing a color picture by four colors of YMCK, 4 times of imaging processes will be repeated.
[0003] Although it can reappear only by K theoretically when the manuscript which should be copied consists of only black and white like the document manuscript seen in office, it becomes a troublesome thing to direct to equipment whether an operator copies only by K by distinguishing a manuscript color in detail or it copies by four colors of YMCK. [many] Moreover, when copying the manuscript with which black and white and a color were intermingled, it will be necessary to classify a manuscript into monochrome manuscript and a color copy beforehand, and to set a manuscript to ADF in 2 steps in a copying machine with an automatic manuscript feed gear (ADF:Auto Document Feeder). So, in JP,63-107274,A, in advance of imaging, the preliminary scan (press can) of the manuscript is carried out as a cure of this fault, and it identifies whether a manuscript is only monochrome image, and when it is monochrome manuscript, the sequence copied only by K is performed. Moreover, when it is a color copy, the sequence copied by four colors of YMCK is performed. However, by this approach, since it is necessary to scan a manuscript once too much [except / for original imaging], the time amount which a copy takes will become long.
[0004] moreover, as an approach of canceling the fault in the case of reading into a JP,3-54972,A official report the manuscript with which monochrome manuscript and the color copy are intermingled by ADF A manuscript color is identified at the same time it performs image formation in K color by the 1st manuscript scan, it is at the 1st scan termination time, and when it discriminates from monochrome manuscript, a copy sequence is closed only by K, and when it discriminates from a color copy, the technique of performing the sequence of the image formation of a color component succeedingly is indicated. By this approach, in order that only the count of a record color may perform a manuscript scan, the time amount which a copy takes does not become long. Thus, by recent years, the ratio of a color copy is increasing rapidly in the manuscript used in office, and when copying the manuscript with which monochrome manuscript and the color copy are intermingled, the copy of a color and monochrome mixture manuscript can be performed by using an ASC (automatic color selection, auto color selection) function, without hanging a help.